

Academic Year: (2019 / 2020)

Review date: 19-03-2019

Department assigned to the subject: Mathematics Department

Coordinating teacher: MOLINA MEYER, MARCELA

Type: Basic Core ECTS Credits : 6.0

Year : 2 Semester : 1

Branch of knowledge: Engineering and Architecture

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Calculus I, Calculus II and Linear Algebra.

OBJECTIVES

The student should be familiar with the most important techniques in complex variable functions. Specifically, he/she should understand and manage the following basic concepts:

1. Elementary functions of one complex variable.
2. Integration in the complex plane.
3. Power series developments.
4. Applications of the residue theorem.

The course is complemented with some basic topics in ordinary differential equations:

1. Solution of first order differential equations.
2. Solution of higher order linear differential equations.
3. Use of Laplace transform to solve linear equations and systems with constant coefficients.

DESCRIPTION OF CONTENTS: PROGRAMME**1. FUNCTIONS OF ONE COMPLEX VARIABLE:**

Complex numbers.
 Analytic functions.
 Cauchy-Riemann equations.
 Harmonic functions.
 Power series and elementary functions.
 Complex integration.
 Cauchy's theorem and applications.
 Laurent series and calculus of residues.
 The residue theorem and applications.

2. ORDINARY DIFFERENTIAL EQUATIONS:

Initial and boundary value problems.
 Existence and unicity.
 Elementary solution methods.
 Linear equations and systems.
 Laplace Transform and applications.

LEARNING ACTIVITIES AND METHODOLOGY

The docent methodology will include:

1. MASTER CLASSES, where the knowledge that the students must acquire will be presented. To make easier the development of the class, the students will have written notes and also will have the basic texts of reference that will facilitate their subsequent work.
2. RESOLUTION OF EXERCISES by the student that will serve as self-evaluation and to acquire the necessary skills.
3. PROBLEM CLASSES, in which the proposed problems are discussed and developed.

4. PARTIAL CONTROLS.

5. FINAL EXAM.

6. TUTORIALS.

ASSESSMENT SYSTEM

The evaluation will be based in the following criteria:

- Partial evaluation controls (40%).
- Final examination (60%).

% end-of-term-examination: 60

% of continuous assessment (assignments, laboratory, practicals...): 40

BASIC BIBLIOGRAPHY

- LEVINSON, N., REDHEFFER, R. M. Complex Variables, Ed. Holden - Day Inc., San Francisco, U.S.A..
- PESTANA, D., RODRÍGUEZ, J. M. Y MARCELLÁN, F. Curso práctico de variable compleja y teoría de transformadas, Pearson Educación, S. A., 2014
- SIMMONS, G.F., and KRANTZ, S.G. Differential Equations. Theory, Technique and Practice , Ed. The McGraw-Hill Companies, Inc. , 2007

ADDITIONAL BIBLIOGRAPHY

- EDWARDS, C. H. Jr., PENNEY, D. E. Elementary Differential Equations with Boundary Value Problems , Ed. Prentice Hall Inc. , 1993
- NAGLE, R.K. y SAFF, E.B. Fundamentals of Differential Equations, second edition , Ed. The Benjamin/Cummings Publishing Company Inc., Redwood City, California, U.S.A..
- PESTANA, D., RODRÍGUEZ, J. M., MARCELLÁN, F. Variable compleja, un curso práctico, Editorial Síntesis, 1999
- VOLKOVYSKII, L.I., LUNTS, G.L. y ARAMANOVICH, I.G. A collection of problems in complex analysis , Ed. Dover, N.Y., U.S.A. , 1991
- WUNSCH, A. D. Complex Variables with Applications , Ed. Addison-Wesley Publishing Company Inc. Reading, Massachusetts , 1994
- ZILL, D. G. Differential Equations with Modeling Applications , Ed. Brookes/Cole Publishing, 6th. ed. .

BASIC ELECTRONIC RESOURCES

- Herbert Gross . Complex Variables, Differential Equations and Linear Algebra: <https://ocw.mit.edu/resources/res-18-008-calculus-revisited-complex-variables-differential-equations-and-linear-algebra-fall-2011/part-i/>